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Drinking Water Surveillance Program

GRIMSBY WATER TREATMENT PLANT

Annual Report 1987

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1988**



**Environment
Ontario**

Jim Bradley, Minister

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1988**

Grimsby water treatment plant :
annual report 1987.

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GRIMSBY
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE
PROGRAM

ANNUAL REPORT 1987

ONTARIO MINISTRY OF ENVIRONMENT
OCTOBER 1988

ACKNOWLEDGEMENTS

The Drinking Water Surveillance Program (DWSP) employs a team approach requiring the co-operative effort of the Ministry of the Environment (MOE) staff from Water Resources and Laboratory Services Branch and the Regions, as well as plant operational staff from the Municipalities.

This annual report was produced by the DWSP Group (Ron Hunsinger, Peter Bohm, Carol Sackville-Duyvelshoff, Chris Fung and John McGrachan) and by Pat Lachmaniuk (on developmental assignment to the Drinking Water Section).

Helpful input and reviews were received from Drinking Water Section Staff, in addition to reviews by other MOE and municipal personnel.

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

GRIMSBY WATER TREATMENT PLANT 1987 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored.

The Grimsby Water Treatment Plant is a conventional treatment plant which treats water from Lake Ontario. The process consist of coagulation, flocculation, sedimentation, filtration and disinfection. Powdered activated carbon is added on as necessary in the summer months to prevent taste and odour problems. This plant serves a population of approximately 15,000 people and has a design capacity of 19 x 1000m³/day.

Water samples from one distribution system site were taken on a monthly basis and analyzed for approximately 160 parameters, 11 times during 1987. Sampling of raw and treated water at the plant was initiated in April and was continued on a monthly basis. Parameters were divided into the following groups Bacteriological, Inorganic and Physical (Laboratory Chemistry, Field Chemistry and Metals) and Organics (Chloroaromatics, Chlorophenols, Pesticides and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles). Specific Pesticides and Chlorophenols were analysed in June and November only.

A summary of results is shown in Table 1.

Due to the sampling frequency of once per month, the DWSP is not designed to evaluate all aspects of the bacteriological quality of the water; however routine bacteriological monitoring as outlined in the Ontario Drinking Water Objectives (ODWOs) is carried out by the operating authority. In terms of the limited DWSP bacteriological examination the water was of good quality.

Inorganic and Physical parameters (Laboratory Chemistry, Field Chemistry and Metals) were below applicable health related ODWOs.

Of approximately 110 Organic parameters tested for on a monthly basis, none exceeded health related guidelines.

Many of the substances detected are naturally occurring or treatment by-products.

During 1987 the DWSP sampling results indicated that the Grimsby Water Treatment Plant produced good quality water at the plant and this quality was maintained throughout the distribution system.

SOMMAIRE

PROGRAMME DE SURVEILLANCE DE L'EAU POTABLE

STATION D'ÉPURATION DE L'EAU DE GRIMSBY RAPPORT ANNUEL 1987

Le Programme de surveillance de l'eau potable (PSEP) de l'Ontario fournit des informations immédiates, fiables et à jour sur la qualité de l'eau potable. Le PSEP a débuté officiellement en avril 1986. Il est destiné à englober tous les réseaux municipaux d'alimentation en eau de l'Ontario. Actuellement, 44 stations en font partie.

La station d'épuration de Grimsby est une station classique qui traite l'eau du lac Ontario. Le traitement comporte la coagulation, la floculation, la décantation, la filtration et la désinfection. On ajoute du charbon actif pulvérulent quand il le faut pendant les mois d'été pour contrôler le goût et l'odeur. Cette station dessert une population d'environ 15 000 habitants et a une capacité nominale de 19 x 1 000 m³/jour.

Des prélèvements d'eau d'un point du réseau de distribution ont été effectués chaque mois. Onze fois en 1987, ces prélèvements ont été analysés par rapport à environ 160 paramètres. L'échantillonnage mensuel de l'eau brute et de l'eau traitée a commencé en avril. Les paramètres étaient répartis dans les catégories suivantes : bactériologique, inorganique et physique (analyses en laboratoire et sur place, présence de métaux) et organique (composés aromatiques chlorés, chlorophénols, pesticides et BPC, dérivés phénoliques, hydrocarbures aromatiques polynucléaires, pesticides particuliers et composés volatils). Les chlorophénols et les pesticides particuliers n'ont été analysés qu'en juin et en novembre.

Le tableau 1 résume les résultats obtenus.

En raison de la fréquence des prélèvements (un par mois), le PSEP ne permet pas d'évaluer tous les aspects de la qualité bactériologique de l'eau. Cependant, comme on le recommande dans le cadre des objectifs relatifs à la qualité de l'eau potable en Ontario, un contrôle bactériologique est effectué par l'exploitant. L'analyse bactériologique limitée du PSEP a révélé une eau de bonne qualité.

Les mesures des paramètres inorganiques et physiques étaient inférieures aux limites applicables fixées par l'Ontario pour l'eau potable.

Pour environ 110 paramètres organiques mesurés chaque mois, aucun résultat n'a dépassé les limites acceptables fixées pour la santé.

Un grand nombre de substances détectées apparaissent naturellement ou sont des produits dérivés de l'épuration.

Les résultats des analyses effectuées en 1987 dans le cadre du PSEP ont indiqué que la station d'épuration de Grimsby donnait une eau de bonne qualité et que cette qualité se maintenait dans tout le réseau de distribution.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE BY SCAN (1987)

SCAN	RAW			TREATED			SITE 1		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	31	29	93	32	10	31	43	12	27
CHEMISTRY (FLD)	27	27	100	54	54	100	82	82	100
CHEMISTRY (LAB)	171	147	85	171	119	69	361	299	82
METALS	180	102	56	150	76	50	397	221	55
CHLOROAROMATICS	117	0	0	104	0	0	143	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	51	0	0	34	0	0	.	.	.
PESTICIDES & PCB	223	0	0	201	1	0	273	0	0
PHENOLICS	9	1	11	9	0	0	.	.	.
SPECIFIC PESTICIDES	126	0	0	126	0	0	99	0	0
VOLATILES	252	2	0	252	37	14	309	46	14
TOTAL	1199	308		1145	297		1707	660	

NO HEALTH RELATED GUIDELINES/LIMITS WERE EXCEEDED

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
 A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

GRIMSBY WATER TREATMENT PLANT 1987 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored. Appendix A contains a detailed description of the DWSP.

The DWSP was initiated at one location in the Grimsby distribution system in February, 1987. Sampling, at the water treatment plant was initiated in April, 1987.

This report contains information and results for 1987.

PLANT DESCRIPTION

The Grimsby Water Treatment Plant is a conventional treatment plant which treats water from Lake Ontario. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. Powdered activated carbon was added as necessary in the summer months to control taste and odour problems. When

demand is high in the summer months a second intake is used along with three pressure filters. This plant serves a population of approximately 15,000 people. It has a rated capacity of $19 \times 1000\text{m}^3/\text{day}$ and daily flows ranging from $1.4 \times 1000\text{m}^3/\text{day}$ to $17 \times 1000\text{m}^3/\text{day}$.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

METHODS

Water samples were obtained from three DWSP approved locations;

- i) Plant Raw - The water originated from the raw water intake prior to the screens and was sampled through a stainless steel sample line.
- ii) Plant Treated - The water originated at the highlift discharge after addition of all treatment chemicals and was sampled through a stainless steel sample line. The sample tap is located in the plant laboratory.
- iii) Distribution System - Site 1 - The distance of the house from the plant is unavailable. Water was sampled through copper plumbing.

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

SITE LOCATION MAP

LOCATION: GRIMSBY WATER TREATMENT PLANT



FIGURE 2
GRIMSBY WATER TREATMENT PLANT

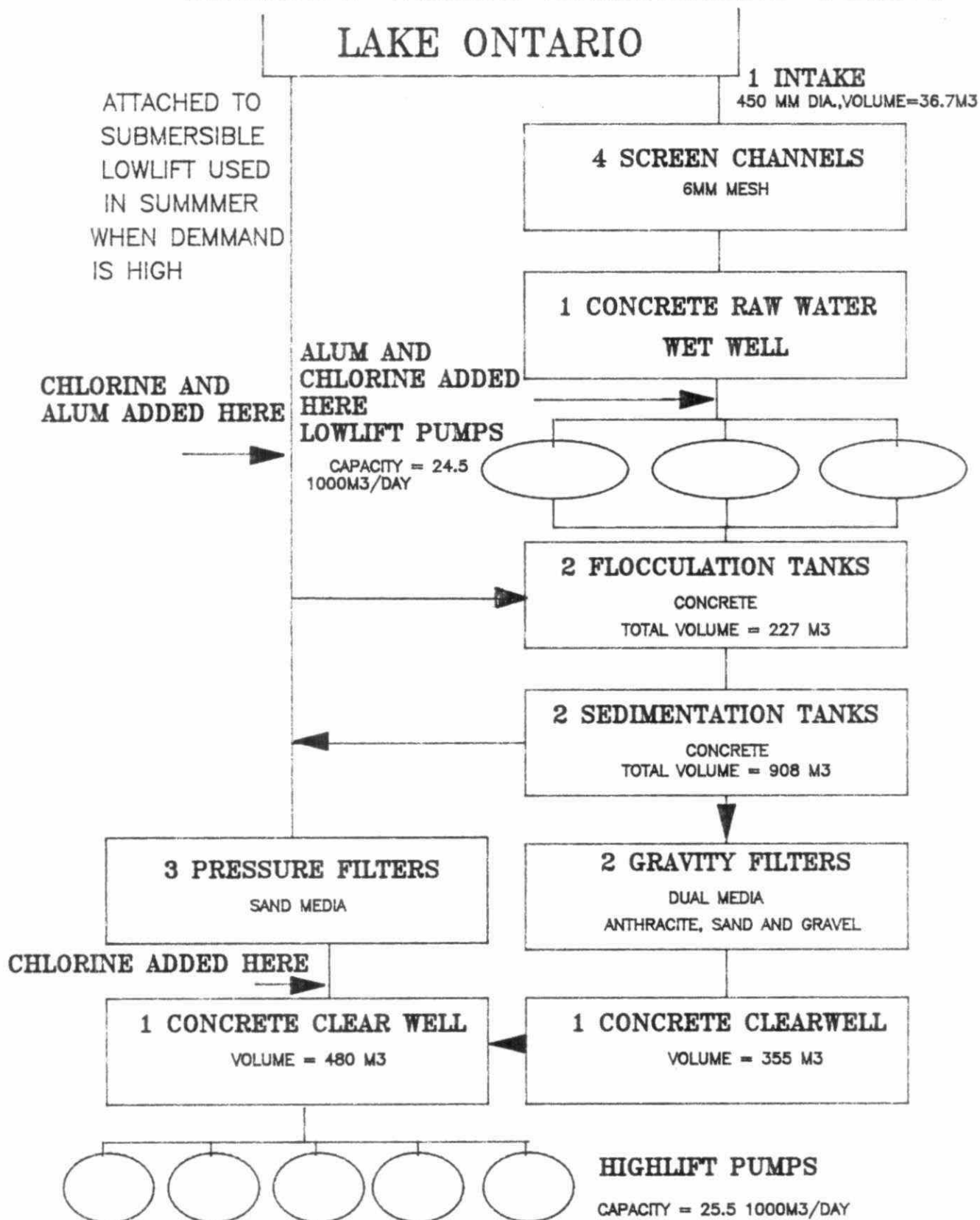


TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

GRIMSBY WATER TREATMENT PLANT

<u>LOCATION:</u>	ELIZABETH STREET GRIMSBY, ONTARIO (MAIL) RR1, FONTHILL ONTARIO L0S 1E0
<u>SOURCE:</u>	RAW WATER SOURCE - LAKE ONTARIO
<u>RATED CAPACITY:</u>	19 (1000 M3/DAY)
<u>OPERATION:</u>	MUNICIPAL
<u>PLANT SUPERINTENDENT:</u>	A. FORBES
<u>MINISTRY REGION:</u>	WEST CENTRAL
<u>DISTRICT OFFICER:</u>	MR. J. W. VOGT

MUNICIPALITY
SERVED

GRIMSBY

POPULATION

15,000

not residual water standing in the sample line.

At the distribution system location two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples are used to make an assessment of the amount by which the levels of inorganic compounds and metals may be changed on standing, due to leaching from (or deposition on), the plumbing system. The only analyses carried out on these samples therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution main that had been flowing for five minutes before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to eliminate any variance (Appendix B).

Sample day flows, treatment chemical dosages and Field Chemistry measurements were recorded on the day of sampling and were entered onto the DWSP data base as submitted.

RESULTS

The distribution system site was sampled 11 times in 1987. Raw and treated water sampling at the treatment plant was initiated in April after adequate sampling lines had been installed.

Specific Pesticides and Chlorophenols were sampled for in June and November only. Polynuclear Aromatic Hydrocarbons and Phenolics were only analysed for in the raw and treated water at the plant.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed for by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value

detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 presents parameters not detected.

Associated guidelines and detection limits are also supplied on both tables. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publictaion (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters, these are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameters Listing System (PALIS) recently initiated by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world.

As stated under Results, traces do not indicate quantifiable results as defined by established MOE laboratory analytical reporting protocols. While they can be useful in trend analysis

or confirmation of the presence of a specific contaminant that is repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.

Bacteriological

Positive results for the Bacteriology scan were present 10 times in the treated water and 12 times in the distribution system Site 1 water. The positive parameters were Standard Plate Count and Total Coliform Background.

Due to its sampling frequency of once per month, the DWSP is not designed to evaluate all aspects of the bacteriological quality of water. Routine bacteriological monitoring, as recommended in the ODWOs is carried out by the operating authority. Water from the Grimsby Water Treatment Plant, in terms of the limited DWSP bacteriological examination, was of good quality.

Inorganic and Physical Parameters

Laboratory and Field Chemistry

The results for the Laboratory Chemistry and Field Chemistry scans were below applicable health related ODWOs.

There are ODWOs that are set for parameters which are related to aesthetic quality rather than health. One of these is Organic Nitrogen. Organic Nitrogen is calculated by subtracting the Ammonia (Ammonium Total) value from the Total Kjeldahl Nitrogen (Nitrogen Tot Kjeld) value. In a number of treated waters and distribution system Site 1 waters, the Organic Nitrogen values exceeded the aesthetic ODWO of 0.15 mg/L. When Organic Nitrogen exceeds 0.15 mg/L in treated water some taste and odour problems can result.

This guideline is exceeded in most supplies. Based on the information obtained from the DWSP, which generally indicates no problems with this parameter exceedence, the guideline may be modified when the ODWOs are reviewed.

It is desirable that the Temperature of drinking water be less than 15°C; the palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The desired ODWO was exceeded in seven treated water and distribution system site samples.

Metals

The results reported for the Metals scan were below any applicable health related ODWOs.

Copper, Manganese and Iron levels were lower in the treated water as compared to the raw. This is a result of the treatment

process. The addition of Alum as a coagulant to the raw water and the resulting coagulation/settling process has been shown to reduce the levels of most metals.

Elevated levels of Iron, Copper and Manganese were present in the distribution system samples indicating that these metals were leached from the distribution system mains as water travelled to the house.

Elevated levels of Copper, Iron and Zinc were detected in the standing samples as compared to the free flow distribution samples thus, indicating that these metals were leached from the household plumbing as the water stood overnight.

At present, there is no evidence that Aluminum is physiologically harmful and no health limit has been specified. The ODWOs indicate that a useful guideline is to maintain a residual below 0.1 mg/L as Al in water leaving the plant to avoid any post precipitation problems. The measure of residual Aluminum in the treated water is important to indicate the efficiency of the treatment process. Aluminum values occasionally exceeded the ODWO operational guideline in the treated and distributed water.

Mercury levels in the raw and treated water were increasing from April to December. Over the past year in the DWSP it has been observed that potassium dichromate, used to preserve Mercury samples, has a limited shelf-life and may show false positives for the presence of Mercury. As the preservative deteriorates,

Mercury levels increase due to interferences and the preservatives are replaced.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that two parameters were detected:

Hexachloroethane

2,4,5 Trichlorotoluene

Hexachloroethane was detected at trace levels, three times in the treated water and once in the distribution system Site 1 water.

2,4,5 Trichlorotoluene was detected at a trace level, once in the raw water.

Review of these results, along with information from other water supplies on DWSP, would indicate that certain chloroaromatics appear more frequently in the treated water than in the raw and almost always only at trace levels. These occurrences could possibly be due to a reaction of chlorine with organics present in the water or in the distribution system.

Chlorophenols

The results of the Chlorophenols scan showed that no parameters were detected.

Pesticides and PCB (Polychlorinated Biphenyls)

The results of the Pesticides and PCB scan showed that three pesticides were detected:

Alpha BHC

Lindane

Thiodan Sulphate

Lindane consists of several isomers of BHC (Benzene Hexachloride). Alpha BHC is the predominant isomer found in water from the Great Lakes Basin as indicated in results from other water supplies on DWSP.

Alpha BHC was detected at trace levels, eight times in the raw water, six times in the treated water and eight times in the distribution system Site 1 water.

Lindane was detected at trace levels, three times in the raw water, three times in the treated water and twice in the distribution system Site 1 water.

Thiodan Sulphate (Endosulfan Sulphate) was detected once in the treated water. The April sample contained a Thiodan Sulphate value of 46 ng/L. The pesticide Thiodan is metabolized to Thiodan Sulphate in soil, it is used in agriculture as a general insecticide. Although no drinking water limit exists for Thiodan Sulphate, the United State Environmental Protection Agency has set an Ambient Water Quality (AWQ) guideline of 74,000 ng/L for

the pesticide Thiodan. AWQ guidelines are designed to ensure that surface water, used as a drinking water source and from which fish are consumed, does not contain substances at levels that would be hazardous to human health. Since both water and fish consumption are considered, AWQ guidelines are usually more stringent than any corresponding drinking water guideline. The positive occurrence was well below the AWQ guideline.

Specific Pesticides

Results of the Specific Pesticides scan showed that one parameter was detected:

Atrazine

Atrazine was detected at a trace level, once in the distribution system Site 1 water.

Phenolics

Phenolics were detected, at trace levels, once in the raw water and twice in the treated water. A positive result of 1.2 ug/L was detected in the May raw water sample. The corresponding treated water sample contained Phenol at a trace level only, indicating that the treatment process was effective in removing most of it. Phenolic compounds are present in the aquatic environment due to natural and/or industrial processes.

Polynuclear Aromatic Hydrocarbons (PAHs)

Results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatiles scan showed that six parameters, other than Trihalomethanes (THMs), were detected:

Benzene

Toluene

Ethylbenzene

Para and Meta-Xylene

Ortho-Xylene.

Benzene was detected at a trace level, twice in the treated water and once in the distribution system Site 1 water.

Toluene was detected at trace levels, twice in the treated water and twice in the distribution system Site 1 water. The values for the October raw, treated and distribution system Site 1 water were considered by Laboratory analysts as unreliable due to contamination as indicated by the 'UCS' remark code.

Ethylbenzene was detected at trace levels, once in the raw water, seven times in the treated water and three times in the distribution Site 1 water.

Para and Meta-Xylene are reported as one compound, M-Xylene. They were detected at trace levels, twice in the treated and distribution system Site 1 water.

Ortho-Xylene (O-Xylene) was detected at a trace level, once in

the distribution system Site 1 water.

These volatiles are typically found on an occasional basis at other water supplies included on the DWSP usually at trace levels.

Trihalomethanes (THMs) are known to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised mainly of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Chlorodibromomethane, Dichlorobromomethane and total THMs were always detected in all treated waters. Bromoform was detected at trace levels seven times in the treated and eight times in the distribution system Site 1 water. All THM occurrences were well below the ODWO of 350 ug/L for Total THMs.

THMs were detected in one raw sample at a trace level indicating the presence of small amounts of chlorine.

CONCLUSIONS

The Grimsby Water Treatment Plant for the sample year of 1987 produced good quality water that was maintained throughout the distribution system.

No health related guidelines, for organic or inorganic parameters were exceeded during 1987.

RECOMMENDATIONS

Three recommendations can be made and are as follows;

- 1) The data base should be reviewed in consultation with Regional, Plant and DWSP personnel to determine if sampling location, sampling frequency and the number of parameters analysed could be revised to allow for a more efficient characterization of the water.
- 2) During 1987 one raw water sample contained very low levels of THMs. This sample site should be reassessed to ensure that it still meets the DWSP sampling protocol.
- 3) A second distribution system site should be added.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SAMPLE DAY CONDITIONS			TREATMENT CHEMICAL DOSAGES (MG/L)				
DATE	RETENTION TIME(HRS)	FLOW (1000 M3)	PRE-CHLORINATION	COAGULATION		TASTE & ODOUR	POST-CHLORINATION
			CHLORINE	ALUM LIQUID	POLY ALUMINUM CHLORIDE	ACTIVATED CARBON POWDER	CHLORINE
FEB 17	5.5	5.4	.90	.	11.92	.	.37
MAR 17	10.7	5.4	1.21	.	18.40	.	.34
APR 27	9.0	5.9	1.68	.	6.77	.	.34
MAY 19	7.9	5.4	1.48	27.56	12.03	.	.28
JUN 15	5.5	12.3	1.09	8.49	.	.	.26
JUL 20	5.5	8.2	2.28	28.54	.	.52	.39
AUG 17	4.5	10.8	1.94	16.08	.	.45	.35
SEP 22	5.4	6.7	.14	24.94	.	.	.40
OCT 20	5.4	6.2	1.16	11.65	.	.	.21
NOV 17	5.4	10.0	1.13	16.74	.	.	.19
DEC 15	8.0	5.2	.68	15.75	.	.	.16

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
BACTERIOLOGICAL	FECAL COLIFORM MEMBRANE FILTRATION	9	7	0	0	0	0	0	0	0	0	0	0
	P/A BOTTLE	0	0	0	9	0	0	11	0	0	0	0	0
	STANDARD PLATE COUNT MEMBRANE FILT.	4	4	0	7	6	0	10	10	0	0	0	0
	TOTAL COLIFORM BACKGROUND MF	9	9	0	8	4	0	11	2	0	0	0	0
	TOTAL COLIFORM MEMBRANE FILTRATION	9	9	0	8	0	0	11	0	0	0	0	0
*TOTAL SCAN BACTERIOLOGICAL		31	29	0	32	10	0	43	12	0	0	0	0
*TOTAL GROUP BACTERIOLOGICAL		31	29	0	32	10	0	43	12	0	0	0	0
CHEMISTRY (FLD)	FIELD COMBINED CHLORINE RESIDUAL	0	0	0	9	9	0	6	6	0	0	0	0
	FIELD FREE CHLORINE RESIDUAL	0	0	0	9	9	0	7	7	0	0	0	0
	FIELD PH	9	9	0	9	9	0	22	22	0	0	0	0
	FIELD TEMPERATURE	9	9	0	9	9	0	22	22	0	0	0	0
	FIELD TOTAL CHLORINE RESIDUAL	0	0	0	9	9	0	6	6	0	0	0	0
	FIELD TURBIDITY	9	9	0	9	9	0	19	19	0	0	0	0
*TOTAL SCAN CHEMISTRY (FLD)		27	27	0	54	54	0	82	82	0	0	0	0
CHEMISTRY (LAB)	ALKALINITY	9	9	0	9	9	0	22	22	0	0	0	0
	AMMONIUM TOTAL	9	7	2	9	3	3	22	13	6	0	0	0
	CALCIUM	9	9	0	9	9	0	22	22	0	0	0	0
	CHLORIDE	9	9	0	9	9	0	22	22	0	0	0	0
	COLOUR	9	4	5	9	0	6	22	1	19	0	0	0
	CONDUCTIVITY	9	9	0	9	9	0	22	22	0	0	0	0
	CYANIDE	9	0	0	9	0	0	9	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
CHEMISTRY (LAB)	FLUORIDE	9	8	0	9	8	0	22	22	0	0	0	0
	HARDNESS	9	9	0	9	9	0	22	22	0	0	0	0
	MAGNESIUM	9	9	0	9	9	0	22	22	0	0	0	0
	NITRITE	9	6	2	9	1	5	22	2	14	0	0	0
	NITROGEN TOTAL KJELDAHL	9	9	0	9	9	0	22	21	1	0	0	0
	PH	9	9	0	9	9	0	22	22	0	0	0	0
	PHOSPHORUS FIL REACT	9	8	1	9	0	6	0	0	0	0	0	0
	PHOSPHORUS TOTAL	9	6	3	9	1	4	0	0	0	0	0	0
	SODIUM	9	9	0	9	9	0	22	22	0	0	0	0
	TOTAL NITRATES	9	9	0	9	9	0	22	22	0	0	0	0
	TOTAL SOLIDS	9	9	0	9	9	0	22	22	0	0	0	0
	TURBIDITY	9	9	0	9	7	2	22	20	2	0	0	0
	*TOTAL SCAN CHEMISTRY (LAB)	171	147	13	171	119	26	361	299	42	0	0	0
METALS	ALUMINUM	9	8	0	7	7	0	20	20	0	0	0	0
	ARSENIC	9	0	0	9	0	0	20	0	0	0	0	0
	BARIUM	9	9	0	7	7	0	20	20	0	0	0	0
	BERYLLIUM	9	0	0	7	0	0	20	0	0	0	0	0
	BORON	9	2	7	9	2	7	22	8	14	0	0	0
	CADMIUM	9	0	0	7	0	0	20	0	0	0	0	0
	CHROMIUM	9	9	0	7	6	0	20	12	0	0	0	0
	COBALT	9	2	0	7	4	0	20	3	0	0	0	0
	COPPER	9	9	0	7	2	0	20	20	0	0	0	0
	CYANIDE	0	0	0	0	0	0	2	0	0	0	0	0
	IRON	9	9	0	7	4	0	20	18	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
METALS	LEAD	9	2	0	7	1	0	20	7	0	0	0	0
	MANGANESE	9	9	0	7	6	0	20	20	0	0	0	0
	MERCURY	9	8	0	9	9	0	11	7	0	0	0	0
	MOLYBDENUM	9	5	0	7	5	0	20	14	0	0	0	0
	NICKEL	9	3	0	7	2	0	20	11	0	0	0	0
	SELENIUM	9	0	0	9	0	0	20	0	0	0	0	0
	STRONTIUM	9	9	0	7	7	0	20	20	0	0	0	0
	URANIUM	9	9	0	9	9	0	22	18	0	0	0	0
	VANADIUM	9	2	0	7	1	0	20	3	0	0	0	0
	ZINC	9	7	0	7	4	0	20	20	0	0	0	0
*TOTAL SCAN METALS		180	102	7	150	76	7	397	221	14	0	0	0
*TOTAL GROUP INORGANIC & PHYSICAL		378	276	20	375	249	33	840	602	56	0	0	0
CHLOROAROMATICS	123 TRICHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	1234 TETRACHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	1235 TETRACHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	124 TRICHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	1245 TETRACHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	135 TRICHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	236 TRICHLOROTOLUENE	9	0	0	8	0	0	11	0	0	0	0	0
	245 TRICHLOROTOLUENE	9	0	1	8	0	0	11	0	0	0	0	0
	26A TRICHLOROTOLUENE	9	0	0	8	0	0	11	0	0	0	0	0
	HEXACHLOROBUTADIENE	9	0	0	8	0	0	11	0	0	0	0	0
	HEXACHLOROETHANE	9	0	0	8	0	3	11	0	1	0	0	0
	OCTACHLOROSTYRENE	9	0	0	8	0	0	11	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
CHLOROAROMATICS	PENTACHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
*TOTAL SCAN CHLOROAROMATICS		117	0	1	104	0	3	143	0	1	0	0	0
CHLOROPHENOLS	234 TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	2345 TETRACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	2356 TETRACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	245-TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	246-TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	PENTACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
*TOTAL SCAN CHLOROPHENOLS		12	0	0	12	0	0	0	0	0	0	0	0
PAH	ANTHANTHRENE	0	0	0	0	0	0	0	0	0	0	0	0
	ANTHRACENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO(A) ANTHRACENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO (A) PYRENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO(B) CHRYSENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO(B) FLUORANTHENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO(E)PYRENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO(G,H,I) PERYLENE	3	0	0	2	0	0	0	0	0	0	0	0
	BENZO(J) FLUORANTHENE	0	0	0	0	0	0	0	0	0	0	0	0
	BENZO(K) FLUORANTHENE	3	0	0	2	0	0	0	0	0	0	0	0
	CHRYSENE	3	0	0	2	0	0	0	0	0	0	0	0
	CORONENE	3	0	0	2	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
PAH	DIBENZO(A,H) ANTHRACENE	3	0	0	2	0	0	0	0	0	0	0	0
	DIMETHYL BENZO(A) ANTHRACENE	3	0	0	2	0	0	0	0	0	0	0	0
	FLUORANTHENE	3	0	0	2	0	0	0	0	0	0	0	0
	INDENO(1,2,3-C,D) PYRENE	3	0	0	2	0	0	0	0	0	0	0	0
	PERYLENE	3	0	0	2	0	0	0	0	0	0	0	0
	PHENANTHRENE	3	0	0	2	0	0	0	0	0	0	0	0
	PYRENE	3	0	0	2	0	0	0	0	0	0	0	0
*TOTAL SCAN PAH		51	0	0	34	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALACHLOR	8	0	0	8	0	0	11	0	0	0	0	0
	ALDRIN	9	0	0	8	0	0	11	0	0	0	0	0
	ALPHA BHC	9	0	8	8	0	6	11	0	8	0	0	0
	ALPHA CHLORDANE	9	0	0	8	0	0	11	0	0	0	0	0
	ATRATONE	8	0	0	8	0	0	11	0	0	0	0	0
	BETA BHC	9	0	0	8	0	0	11	0	0	0	0	0
	DIELDRIN	9	0	0	8	0	0	11	0	0	0	0	0
	ENDRIN	9	0	0	8	0	0	11	0	0	0	0	0
	ETHYLENE DIBROMIDE	9	0	0	9	0	0	9	0	0	0	0	0
	GAMMA CHLORDANE	9	0	0	8	0	0	11	0	0	0	0	0
	HEPTACHLOR	9	0	0	8	0	0	11	0	0	0	0	0
	HEPTACHLOR EPOXIDE	9	0	0	8	0	0	11	0	0	0	0	0
	HEXACHLOROBENZENE	9	0	0	8	0	0	11	0	0	0	0	0
	LINDANE	9	0	3	8	0	3	11	0	2	0	0	0
	METHOXYCHLOR	9	0	0	8	0	0	11	0	0	0	0	0
	MIREX	9	0	0	8	0	0	11	0	0	0	0	0

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

[illegible]

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
SPECIFIC PESTICIDES	BLADEX	8	0	0	8	0	0	11	0	0	0	0	0
	BUX (METALKAMATE)	2	0	0	2	0	0	0	0	0	0	0	0
	CARBOFURAN	2	0	0	2	0	0	0	0	0	0	0	0
	DIALATE	2	0	0	2	0	0	0	0	0	0	0	0
	DIAZINON	2	0	0	2	0	0	0	0	0	0	0	0
	DICAMBA	2	0	0	2	0	0	0	0	0	0	0	0
	DICHLOROVOS	2	0	0	2	0	0	0	0	0	0	0	0
	DURSBAN	2	0	0	2	0	0	0	0	0	0	0	0
	EPTAM	2	0	0	2	0	0	0	0	0	0	0	0
	ETHION	2	0	0	2	0	0	0	0	0	0	0	0
	GUTHION	0	0	0	0	0	0	0	0	0	0	0	0
	IPC	2	0	0	2	0	0	0	0	0	0	0	0
	MALATHION	2	0	0	2	0	0	0	0	0	0	0	0
	METHYL PARATHION	2	0	0	2	0	0	0	0	0	0	0	0
	METHYLTRITHION	2	0	0	2	0	0	0	0	0	0	0	0
	METOLACHLOR	8	0	0	8	0	0	11	0	0	0	0	0
	MEVINPHOS	2	0	0	2	0	0	0	0	0	0	0	0
	PARATHION	2	0	0	2	0	0	0	0	0	0	0	0
	PHORATE (THIMET)	2	0	0	2	0	0	0	0	0	0	0	0
	PICHLORAM	0	0	0	0	0	0	0	0	0	0	0	0
	PROMETONE	8	0	0	8	0	0	11	0	0	0	0	0
	PROMETRYNE	8	0	0	8	0	0	11	0	0	0	0	0
	PROPAZINE	8	0	0	8	0	0	11	0	0	0	0	0
	PROPOXUR	2	0	0	2	0	0	0	0	0	0	0	0
	RELDAN	2	0	0	2	0	0	0	0	0	0	0	0
	RONNEL	2	0	0	2	0	0	0	0	0	0	0	0
	SENCOR	8	0	0	8	0	0	11	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
SPECIFIC PESTICIDES	SEVIN (CARBARYL)	2	0	0	2	0	0	0	0	0	0	0	0
	SILVEX	2	0	0	2	0	0	0	0	0	0	0	0
	SIMAZINE	8	0	0	8	0	0	11	0	0	0	0	0
	SUTAN (BUTYLATE)	2	0	0	2	0	0	0	0	0	0	0	0
	TOXAPHENE	0	0	0	0	0	0	0	0	0	0	0	0
*TOTAL SCAN SPECIFIC PESTICIDES		126	0	0	126	0	0	99	0	1	0	0	0
VOLATILES	1,1 DICHLOROETHANE	9	0	0	9	0	0	11	0	0	0	0	0
	1,1 DICHLOROETHYLENE	9	0	0	9	0	0	11	0	0	0	0	0
	1,2 DICHLOROBENZENE	9	0	0	9	0	0	11	0	0	0	0	0
	1,2 DICHLOROETHANE	9	0	0	9	0	0	11	0	0	0	0	0
	1,2 DICHLOROPROPANE	9	0	0	9	0	0	11	0	0	0	0	0
	1,3 DICHLOROBENZENE	9	0	0	9	0	0	11	0	0	0	0	0
	1,4 DICHLOROBENZENE	9	0	0	9	0	0	11	0	0	0	0	0
	111, TRICHLOROETHANE	9	0	0	9	0	0	11	0	0	0	0	0
	112 TRICHLOROETHANE	9	0	0	9	0	0	11	0	0	0	0	0
	1122 TETRA-CHLOROETHANE	9	0	0	9	0	0	11	0	0	0	0	0
	BENZENE	9	0	0	9	0	2	11	0	1	0	0	0
	BROMOFORM	9	0	0	9	0	7	11	1	8	0	0	0
	CARBON TETRACHLORIDE	9	0	0	9	0	0	11	0	0	0	0	0
	CHLOROBENZENE	9	0	0	9	0	0	11	0	0	0	0	0
	CHLORODIBROMOMETHANE	9	0	0	9	9	0	11	11	0	0	0	0
	CHLOROFORM	9	0	1	9	9	0	11	11	0	0	0	0
	DICHLOROBROMOMETHANE	9	0	0	9	9	0	11	11	0	0	0	0
	ETHYLENE DIBROMIDE	0	0	0	0	0	0	2	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
VOLATILES	ETHYLBENZENE	9	0	1	9	0	7	11	0	3	0	0	0
	M-XYLENE	9	0	0	9	0	2	11	0	2	0	0	0
	METHYLENE CHLORIDE	9	0	0	9	0	0	10	0	0	0	0	0
	O-XYLENE	9	0	0	9	0	0	11	0	1	0	0	0
	P-XYLENE	9	0	0	9	0	0	11	0	0	0	0	0
	TETRACHLOROETHYLENE	9	0	0	9	0	0	11	0	0	0	0	0
	TOLUENE	9	1	0	9	1	2	11	1	2	0	0	0
	TOTAL TRIHALOMETHANES	9	1	0	9	9	0	11	11	0	0	0	0
	TRANS 1,2 DICHLOROETHYLENE	9	0	0	9	0	0	11	0	0	0	0	0
	TRICHLOROETHYLENE	9	0	0	9	0	0	11	0	0	0	0	0
	TRIFLUOROCHLOROTOLUENE	9	0	0	9	0	0	11	0	0	0	0	0
*TOTAL SCAN VOLATILES		252	2	2	252	37	20	309	46	17	0	0	0
*TOTAL GROUP ORGANIC		790	3	15	738	38	34	824	46	29	0	0	0

TOTAL		1199	308	35	1145	297	67	1707	660	85	0	0	0

KEY TO TABLES 5 AND 6

- A ONTARIO DRINKING WATER OBJECTIVES
1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 - 1*. MAC for Bacteriological Analyses
- Poor water quality is indicated when :
- total coliform counts $> 0 < 5$
 - P/A Bottle Test is present after 48 hours
 - Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
 - Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
 - Standard Plate Count should not exceed 500 organisms per ml at 35 deg C within 48 hours
2. Interim Maximum Acceptable Concentration (IMAC)
 3. Maximum Desirable Concentration (MDC)
 4. Aesthetic or Recommended Operational Guideline
- hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness > 200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.
- B HEALTH & WELFARE CANADA
1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
- C WORLD HEALTH ORGANIZATION
1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- H USSR MAXIMUM PERMISSIBLE CONCENTRATION
- I NEW YORK STATE AMBIENT WATER GUIDELINE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!AW	No Data: Analysis Withdrawn
!CR	No Data: Could Not Confirm By Reanalysis
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample

RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM	
RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	

BACTERIOLOGICAL					
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)	
APR	1	.	.	.	
MAY	1	.	.	.	
JUN	0	.	.	.	
JUL	150 >	.	.	.	
AUG	4	.	.	.	
SEP	16	.	.	.	
OCT	2	.	.	.	
NOV	0	.	.	.	
DEC	3	.	.	.	

STANDRD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A1)	
FEB	.	.	.	3	
MAR	.	.	.	24	
APR	124	4	.	122	
MAY	!AW	!AW	.	!AW	
JUN	320	260	.	58	
JUL	!OP	1	.	137	
AUG	!OP	40	.	58	
SEP	!OP	!OP	.	300	
OCT	180	4	.	37	
NOV	!LA	10	.	54	
DEC	220	0	.	56	

P/A BOTTLE (0=ABSENT)		DET'N LIMIT = 0		GUIDELINE = 0 (A1*)	
FEB	.	.	.	0	
MAR	.	.	.	0	
APR	.	0	.	0	
MAY	.	0	.	0	
JUN	.	0	.	0	
JUL	.	0	.	0	
AUG	.	0	.	0	
SEP	.	0	.	0	
OCT	.	0	.	0	
NOV	.	0	.	0	
DEC	.	0	.	0	

TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)	
FEB	.	.	.	0	
MAR	.	.	.	0	
APR	2 A3C	0	.	0	
MAY	25	0	.	0	
JUN	16	0	.	0	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
RAW	TREATED	SITE 1		
			STANDING	FREE FLOW
JUL	3600 A3C	!LA	.	0
AUG	28 A3C	0	.	0
SEP	92 A3C	0	.	0
OCT	18 A3C	0	.	0
NOV	20 A3C	0	.	0
DEC	121 A3C	0	.	0
T COLIFORM BCKGRD MF (CT/100ML)				
			DET'N LIMIT = 0	GUIDELINE = N/A
FEB	.	.	.	0
MAR	.	.	.	0
APR	740	0	.	0
MAY	130	2	.	0
JUN	540	4	.	0
JUL	40000 >	!LA	.	9
AUG	40000 >	2	.	1
SEP	45000	0	.	0
OCT	1100	0	.	0
NOV	3500	0	.	0
DEC	730	2	.	0

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW

CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = N/A	GUIDELINE = N/A
FEB100
APR	.	.100	.	.200
MAY	.	.200	.	.200
JUN	.	.100	.	.100
JUL	.	.080	.	.
AUG	.	.100	.	.
SEP	.	.100	.	.
OCT	.	.090	.	.
NOV	.	.060	.	.100
DEC	.	.200	.	.090

FLD CHLORINE FREE (MG/L)			DET'N LIMIT = N/A	GUIDELINE = N/A
FEB100
APR	.	.400	.	.100
MAY	.	.100	.	.100
JUN	.	.300	.	.100
JUL	.	.400	.	.100
AUG	.	.310	.	.
SEP	.	.320	.	.
OCT	.	.260	.	.
NOV	.	.330	.	.100
DEC	.	.500	.	.130

TOTAL CHLORINE (MG/L)			DET'N LIMIT = N/A	GUIDELINE = N/A
FEB100
APR	.	.500	.	.300
MAY	.	.300	.	.300
JUN	.	.400	.	.100
JUL	.	.320	.	.
AUG	.	.410	.	.
SEP	.	.220	.	.
OCT	.	.350	.	.
NOV	.	.390	.	.200
DEC	.	.700	.	.220

FLD PH (DMSNLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5 (A4)
FEB	.	.	7.500	7.600
MAR	.	.	7.400	7.500
APR	7.600	7.600	7.000	7.600
MAY	7.800	7.400	7.400	7.600
JUN	7.900	7.500	7.600	7.600
JUL	7.700	7.400	7.600	7.400

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
AUG	7.700	7.100	7.600	7.600
SEP	7.600	7.100	7.600	7.400
OCT	7.700	7.300	7.600	7.500
NOV	7.800	7.400	7.000	7.600
DEC	7.700	7.600	7.600	7.500

TEMPERATURE (DEG.C)	DET'N LIMIT = N/A		GUIDELINE =	N/A
FEB	.	.	12.000	4.000
MAR	.	.	14.000	4.000
APR	7.500	10.000	15.000	10.000
MAY	9.500	9.000	15.000	11.000
JUN	12.000	13.000	18.000	16.000
JUL	19.500	17.000	22.000	20.000
AUG	20.000	19.000	21.000	21.000
SEP	17.000	17.000	19.000	18.000
OCT	7.500	7.500	17.000	14.000
NOV	5.500	5.500	14.000	12.000
DEC	3.000	3.000	15.000	9.000

FLD TURBIDITY (FTU)	DET'N LIMIT = N/A		GUIDELINE = 1.0	(A1)
FEB	.	.	.170	.190
MAR	.	.	.190	.600
APR	6.700	.100	.330	.560
MAY	2.600	.100	.190	.190
JUN	1.100	.160	.600	.300
JUL	7.500	.090	.160	.450
AUG	2.100	.090	.160	.120
SEP	13.000	.070	.	.150
OCT	1.100	.080	.	.210
NOV	5.800	.110	.060	.150
DEC	2.200	.080	.	.120

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
RAW	TREATED	SITE 1	STANDING	FREE FLOW

CHEMISTRY (LAB)				
ALKALINITY (MG/L)		DET'N LIMIT = .200	GUIDELINE = 30-500 (A4)	
FEB	.	.	100.600	101.000
MAR	.	.	95.900	96.200
APR	102.700	97.400	97.600	97.700
MAY	101.600	95.500	96.500	93.000
JUN	101.900	95.100	93.500	94.100
JUL	95.300	87.900	84.200	85.000
AUG	97.900	86.300	87.600	88.100
SEP	95.600	84.200	86.600	85.500
OCT	101.500	96.300	95.100	95.000
NOV	101.000	92.500	93.500	94.000
DEC	100.600	91.900	92.500	93.100

CALCIUM (MG/L)		DET'N LIMIT = .100	GUIDELINE = 100. (F2)	
FEB	.	.	44.100	44.200
MAR	.	.	41.600	41.900
APR	39.700	39.600	40.800	39.600
MAY	42.000	41.800	42.800	43.400
JUN	39.800	41.200	41.800	42.000
JUL	39.800	39.600	41.400	39.600
AUG	37.000	37.600	38.200	38.000
SEP	39.000	40.800	40.400	40.200
OCT	39.800	41.000	41.200	41.200
NOV	41.800	41.600	41.400	42.000
DEC	40.000	39.600	38.200	39.200

CHLORIDE (MG/L)		DET'N LIMIT = .200	GUIDELINE = 250.0 (A3)	
FEB	.	.	32.000	32.000
MAR	.	.	30.500	30.000
APR	29.500	32.500	32.000	31.500
MAY	24.500	29.000	28.000	27.500
JUN	25.500	27.000	27.500	28.500
JUL	27.000	27.000	27.000	26.500
AUG	23.500	26.000	26.500	26.000
SEP	23.000	25.500	26.500	26.000
OCT	23.400	24.500	24.400	24.300
NOV	24.200	25.200	25.700	25.100
DEC	25.200	26.100	26.100	25.300

COLOUR (TCU)		DET'N LIMIT = .5	GUIDELINE = 5.0 (A3)	
FEB	.	.	1.000 <T	2.000
MAR	.	.	2.000 <T	2.000 <T
APR	4.000	2.000 <T	2.000 <T	2.000 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MAY	2.000 <T	BDL	1.000 <T	1.000 <T
JUN	2.500 <T	BDL	BDL	BDL
JUL	2.500	BDL	1.000 <T	1.000 <T
AUG	2.000 <T	.500 <T	1.500 <T	1.000 <T
SEP	2.500	.500 <T	1.000 <T	1.000 <T
OCT	2.000 <T	.500 <T	.500 <T	1.000 <T
NOV	2.000 <T	.500 <T	.500 <T	1.000 <T
DEC	2.500	.500 <T	1.000 <T	1.000 <T
<hr/>				
CONDUCTIVITY (UMHO/CM)		DET'N LIMIT = 1		GUIDELINE = 400. (F2)
FEB	.	.	365	366
MAR	.	.	361	359
APR	353	354	352	351
MAY	338	346	351	350
JUN	334	338	342	345
JUL	342	340	346	333
AUG	320	327	327	325
SEP	316	332	338	332
OCT	328	333	330	329
NOV	333	336	339	338
DEC	339	340	344	335
<hr/>				
FLUORIDE (MG/L)		DET'N LIMIT = .01		GUIDELINE = 2.400 (A1)
FEB	.	.	.130	.140
MAR	.	.	.130	.140
APR	.170	.160	.170	.160
MAY	.110	.100	.090	.080
JUN	.150	.140	.140	.120
JUL	.140	.110	.090	.110
AUG	.140	.120	.140	.140
SEP	.140	.100	.100	.100
OCT	BDL	BDL	.120	.120
NOV	.100	.100	.100	.120
DEC	.140	.120	.120	.120
<hr/>				
HARDNESS (MG/L)		DET'N LIMIT = .500		GUIDELINE = 80-100 (A4)
FEB	.	.	149.500	149.500
MAR	.	.	142.500	142.500
APR	136.000	136.000	138.500	135.500
MAY	142.000	138.000	140.000	141.000
JUN	134.000	138.000	140.000	141.000
JUL	136.000	134.000	139.000	134.000
AUG	126.000	128.000	130.000	129.000
SEP	134.000	139.000	138.000	138.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
OCT	135.000	138.000	139.000	139.000
NOV	141.000	139.000	137.000	140.000
DEC	137.000	135.000	131.000	134.000
<hr/>				
MAGNESIUM (MG/L)			DET'N LIMIT = .050	GUIDELINE = 30. (F2)
FEB	.	.	9.550	9.550
MAR	.	.	9.400	9.100
APR	8.900	9.000	8.900	8.900
MAY	9.000	8.300	8.100	8.000
JUN	8.300	8.600	8.700	8.700
JUL	8.900	8.600	8.600	8.400
AUG	8.200	8.300	8.400	8.200
SEP	8.900	9.000	9.000	9.000
OCT	8.700	8.600	8.700	8.700
NOV	8.800	8.400	8.200	8.600
DEC	9.000	8.800	8.800	8.700
<hr/>				
SODIUM (MG/L)			DET'N LIMIT = .200	GUIDELINE = 200. (C3)
FEB	.	.	16.000	15.600
MAR	.	.	14.400	14.100
APR	14.800	15.000	14.700	14.600
MAY	13.400	13.400	13.000	13.200
JUN	11.800	13.000	13.000	13.400
JUL	14.000	13.000	12.600	12.600
AUG	12.200	12.400	12.200	12.400
SEP	12.600	12.800	13.600	13.200
OCT	12.400	12.200	12.600	12.400
NOV	13.400	12.800	12.800	13.000
DEC	13.400	13.200	13.200	13.000
<hr/>				
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .05 (F2)
FEB	.	.	.008 <T	.004 <T
MAR	.	.	.036	.010
APR	.020	BDL	.048	BDL
MAY	.048	BDL	.008 <T	BDL
JUN	.070	.010	.084	.010
JUL	.004 <T	.008 <T	.098	.012
AUG	.004 <T	.022	.082	.024
SEP	.020	.010	.014	.010
OCT	.042	.004 <T	.008 <T	.004 <T
NOV	.022	.004 <T	.010	.004 <T
DEC	.018	BDL	.148	BDL
<hr/>				
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1.000 (A1)

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
FEB	.	.	.002 <T	.002 <T
MAR	.	.	.002 <T	.002 <T
APR	.005	.001 <T	.001 <T	BDL
MAY	.011	BDL	BDL	.001 <T
JUN	.025	.002 <T	.002 <T	.001 <T
JUL	.001 <T	.001 <T	.002 <T	.001 <T
AUG	.065	.029	.025	.027
SEP	.022	.003 <T	.003 <T	.003 <T
OCT	BDL	BDL	BDL	BDL
NOV	.011	.001 <T	.002 <T	.001 <T
DEC	.001 <T	BDL	BDL	BDL
<hr/>				
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020	GUIDELINE = 10.000 (A1)
FEB	.	.	.470	.460
MAR	.	.	.575	.555
APR	.415	.410	.510	.405
MAY	.345	.330	.325	.325
JUN	.325	.295	.440	.295
JUL	.360	.270	.420	.255
AUG	.280	.220	.330	.205
SEP	.235	.200	.205	.205
OCT	.355	.340	.335	.325
NOV	.430	.400	.390	.380
DEC	.455	.400	.685	.390
<hr/>				
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = .020	GUIDELINE = N/A
FEB	.	.	.250	.230
MAR	.	.	.300	.330
APR	.170	.130	.120	.090 <T
MAY	.210	.100	.100	.100
JUN	.170	.150	.230	.150
JUL	.220	.180	.230	.130
AUG	.320	.190	.290	.220
SEP	.190	.130	.170	.150
OCT	.260	.160	.180	.170
NOV	.230	.160	.160	.170
DEC	.200	.140	.350	.140
<hr/>				
PH (DMSNLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
FEB	.	.	7.970	7.930
MAR	.	.	8.170	8.180
APR	8.300	8.220	8.220	8.200
MAY	8.380	8.220	8.200	8.180
JUN	8.500	8.260	8.220	8.210

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
JUL	8.190	8.000	7.980	7.980
AUG	8.260	7.960	8.050	8.020
SEP	8.240	7.940	7.970	8.160
OCT	8.240	8.050	8.080	8.090
NOV	8.200	8.150	8.230	8.250
DEC	8.390	8.350	8.380	8.380

PHOSPHORUS FIL REACT (MG/L)	DET'N LIMIT = .5UG/L		GUIDELINE =	N/A
APR	.002	.001 <T	.	.
MAY	.007	.000 <T	.	.
JUN	.003	BDL	.	.
JUL	.015	.000 <T	.	.
AUG	.006	.000 <T	.	.
SEP	.010	BDL	.	.
OCT	.002 <T	BDL	.	.
NOV	.003	.001 <T	.	.
DEC	.006	.002 <T	.	.

PHOSPHORUS TTL-UNFIL (MG/L)	DET'N LIMIT = .002		GUIDELINE = .40	(F2)
APR	.014	.003	.	.
MAY	.014	BDL	.	.
JUN	.006 <T	BDL	.	.
JUL	.030	.003 <T	.	.
AUG	.022	.002 <T	.	.
SEP	.019	.004 <T	.	.
OCT	.009 <T	.002 <T	.	.
NOV	.008 <T	BDL	.	.
DEC	.011	BDL	.	.

RESIDUE (TOTAL) (MG/L)	DET'N LIMIT = 1.		GUIDELINE = 500.	(A3)
FEB	.	.	237 CRO	238 CRO
MAR	.	.	235 CRO	233 CRO
APR	229 CRO	230 CRO	229 CRO	228 CRO
MAY	220 CRO	225 CRO	228 CRO	228 CRO
JUN	217 CRO	220 CRO	222 CRO	224 CRO
JUL	222 CRO	221 CRO	225 CRO	216 CRO
AUG	208 CRO	213 CRO	213 CRO	211 CRO
SEP	205 CRO	216 CRO	220 CRO	216 CRO
OCT	213 CRO	216 CRO	215 CRO	214 CRO
NOV	216 CRO	218 CRO	220 CRO	220 CRO
DEC	220 CRO	221 CRO	224 CRO	218 CRO

TURBIDITY (FTU)	DET'N LIMIT = .02		GUIDELINE = 1.00	(A1)
FEB	.	.	.310	.100

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
				STANDING FREE FLOW
MAR	.	.	.400	.070
APR	4.400	.200	.230	.110
MAY	1.060	.100	.150	.080
JUN	.360	.220	.360	.170
JUL	4.600	.160	.260	.120
AUG	1.390	.110	.400	.160
SEP	14.500	.140	.100	.100
OCT	.460	.120	.090 <T	.120
NOV	6.100	.040 <T	.150	.120
DEC	1.050	.080 <T	.560	.100 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
RAW	TREATED	SITE 1	STANDING	FREE FLOW
<hr/>				
METALS				
ALUMINUM (MG/L)		DET'N LIMIT = .004	GUIDELINE = .10	(A4)
FEB	.	!	.047	
MAR	.	.058	.054	
APR	.081	.150	.190	
MAY	.051	.250	.075	
JUN	BDL	!	.130	
JUL	.140	.067	.069	
AUG	.007	.150	.260	
SEP	.310	!	.074	
OCT	.016	.057	.071	
NOV	.150	.060	.067	
DEC	.042	.036	.049	.038
<hr/>				
BARIUM (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 1.000	(A1)
FEB	.	!	.022	
MAR	.	.021	.021	
APR	.024	.023	.021	
MAY	.024	.026	.027	.025
JUN	.020	!	.021	.020
JUL	.022	.021	.022	.021
AUG	.024	.023	.022	.022
SEP	.022	!	.021	.021
OCT	.019	.019	.018	.019
NOV	.020	.018	.021	.018
DEC	.020	.018	.019	.017
<hr/>				
BORON (MG/L)		DET'N LIMIT = 0.01	GUIDELINE = 5.000	(A1)
FEB	.	.040	.030	
MAR	.	.020	.020	
APR	.030	.040	.030	.030
MAY	.040 <T	.040 <T	.030 <T	.020 <T
JUN	.030	.030	.040	.030
JUL	.030 <T	.030 <T	.030 <T	.020 <T
AUG	.030 <T	.040 <T	.030 <T	.030 <T
SEP	.030 <T	.030 <T	.040 <T	.030 <T
OCT	.030 <T	.030 <T	.030 <T	.030 <T
NOV	.030 <T	.040 <T	.030 <T	.030 <T
DEC	.034 <T	.046 <T	.035 <T	.041 <T
<hr/>				
COBALT (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 1.0	(H)
FEB	.	!	BDL	
MAR	.	.001	.001	
APR	BDL	.001	!	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MAY	.001	.002	BDL	.002
JUN	BDL	! IS	BDL	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	.001	BDL	BDL
SEP	BDL	! IS	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	.002	.001	BDL	BDL

CHROMIUM (MG/L)	DET'N LIMIT = 0.001		GUIDELINE = .05 (A1)	
FEB	.	.	! IS	BDL
MAR	.	.	BDL	BDL
APR	.001	BDL	! RE	BDL
MAY	.001	.001	.001	.001
JUN	.001	! IS	.001	.001
JUL	.001	.001	.001	BDL
AUG	.001	.001	BDL	.001
SEP	.001	! IS	BDL	BDL
OCT	.002	.002	.001	.002
NOV	.002	.003	.002	.002
DEC	.002	.002	.002	.002

COPPER (MG/L)	DET'N LIMIT = .001		GUIDELINE = 1.0 (A3)	
FEB	.	.	! IS	.002
MAR	.	.	.014	.002
APR	.010	BDL	! RE	.001
MAY	.013	BDL	.012	.001
JUN	.005	! IS	.007	.002
JUL	.008	BDL	.008	.003
AUG	.013	.001	.013	.003
SEP	.012	! IS	.006	.003
OCT	.006	.001	.018	.003
NOV	.008	BDL	.039	.002
DEC	.004	BDL	.023	.003

IRON (MG/L)	DET'N LIMIT = .002		GUIDELINE = .300 (A3)	
FEB	.	.	! IS	.011
MAR	.	.	.012	.009
APR	.140	.005	! RE	.009
MAY	.120	BDL	.340	.030
JUN	.021	! IS	.013	.008
JUL	.210	.004	.014	.015
AUG	.016	.009	.046	.055
SEP	.400	! IS	.042	.003

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
OCT	.043	BDL	.004	.010
NOV	.180	BDL	BDL	BDL
DEC	.055	.005	.031	.020

MERCURY (UG/L)	DET'N LIMIT = 0.010		GUIDELINE = 1.000 (A1)	
FEB	.	.	.	BDL
MAR010 UNP
APR	.050	.050	.	.010
MAY	.050	.040	.	BDL
JUN	.080	.070	.	.010
JUL	.050	.060	.	.010
AUG	.110	.090	.	BDL
SEP	.120	.130	.	.010
OCT	.120	.130	.	.010
NOV	BDL	.100	.	BDL
DEC	.210	.180	.	.020

MANGANESE (MG/L)	DET'N LIMIT = .001		GUIDELINE = .050 (A3)	
FEB	.	.	!!S	.003
MAR	.	.	.003	.004
APR	.007	BDL	!RE	.003
MAY	.006	.001	.008	.006
JUN	.003	!!S	.003	.002
JUL	.017	.001	.006	.005
AUG	.005	.001	.005	.005
SEP	.018	!!S	.004	.003
OCT	.004	.001	.003	.004
NOV	.011	.001	.004	.004
DEC	.005	.002	.005	.004

MOLYBDENUM (MG/L)	DET'N LIMIT = 0.001		GUIDELINE = .50 (H)	
FEB	.	.	!!S	.001
MAR	.	.	.001	.001
APR	.001	.001	!RE	.001
MAY	.001	.001	BDL	.001
JUN	.001	!!S	.001	.001
JUL	BDL	.001	.001	.001
AUG	.001	.001	.001	.001
SEP	BDL	!!S	.001	.001
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.001	BDL
DEC	.001	.002	BDL	BDL

NICKEL (MG/L)	DET'N LIMIT = 0.001		GUIDELINE = .05 (F3)	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
FEB	.	.	!IS	BDL
MAR	.	.	.020	.002
APR	.002	BDL	!RE	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	!IS	.005	BDL
JUL	BDL	BDL	.010	BDL
AUG	BDL	BDL	BDL	.002
SEP	BDL	!IS	.098	BDL
OCT	.002	.002	.002	.002
NOV	BDL	BDL	.004	BDL
DEC	.002	.002	.018	.002

LEAD (MG/L)			DET'N LIMIT = 0.003	GUIDELINE = .050 (A1)
FEB	.	.	!IS	BDL
MAR	.	.	.011	.007
APR	.006	BDL	!RE	BDL
MAY	.007	.007	.009	.008
JUN	BDL	!IS	.003	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	!IS	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.004	BDL
DEC	BDL	BDL	.006	BDL

STRONTIUM (MG/L)			DET'N LIMIT = .001	GUIDELINE = 2.00 (H)
FEB	.	.	!IS	.200
MAR	.	.	.180	.190
APR	.200	.200	!RE	.180
MAY	.200	.200	.200	.200
JUN	.170	!IS	.180	.170
JUL	.190	.180	.180	.170
AUG	.170	.170	.170	.170
SEP	.170	!IS	.180	.180
OCT	.160	.160	.160	.160
NOV	.160	.160	.180	.170
DEC	.170	.170	.170	.160

URANIUM (UG/L)			DET'N LIMIT = .02	GUIDELINE = 20. (A2)
FEB	.	.	BDL	BDL
MAR	.	.	BDL	BDL
APR	.360	.220	.270	.250
MAY	.350	.190	.220	.400
JUN	.290	.310	.260	.200

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
JUL	.330	.120	.120	.120
AUG	.030	.020	.020	.030
SEP	.440	.140	.160	.160
OCT	.460	.280	.320	.350
NOV	.370	.230	.180	.230
DEC	.300	.300	.200	.700

VANADIUM (MG/L)	DET'N LIMIT = .001		GUIDELINE = .10 (H)	
FEB	.	.	!IS	BDL
MAR	.	.	BDL	BDL
APR	BDL	BDL	!RE	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	!IS	BDL	BDL
JUL	.001	BDL	BDL	BDL
AUG	BDL	BDL	.001	BDL
SEP	.001	!IS	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	.002	.001	.002
DEC	BDL	BDL	BDL	BDL

ZINC (MG/L)	DET'N LIMIT = .001		GUIDELINE = 5.00 (A3)	
FEB	.	.	!IS	.002
MAR	.	.	.016	.002
APR	.002	.001	!RE	.001
MAY	.008	.031	.094	.061
JUN	.002	!IS	.005	.003
JUL	.004	.001	.010	.003
AUG	.002	.004	.014	.002
SEP	.003	!IS	.008	.001
OCT	BDL	BDL	.010	.003
NOV	BDL	BDL	.026	.002
DEC	.002	BDL	.022	.002

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM
RAW		TREATED	SITE 1	
		STANDING	FREE FLOW	

CHLOROAROMATICS				
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900. (D4)
FEB	.	.	.	BDL
MAR	.	.	.	BDL
APR	BDL	8.000 <T	.	1.000 <T
MAY	BDL	6.000 <T	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	1.000 <T	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	!LA	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL

245 TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A
FEB	.	.	.	BDL
MAR	.	.	.	BDL
APR	8.000 <T	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	!LA	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
RAW	TREATED	SITE 1	STANDING	FREE FLOW
PESTICIDES & PCB				
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700.	(G)
FEB	.	.	4.000 <T	
MAR	.	.	4.000 <T	
APR	3.000 <T	4.000 <T	2.000 <T	
MAY	3.000 <T	2.000 <T	2.000 <T	
JUN	2.000 <T	3.000 <T	2.000 <T	
JUL	1.000 <T	2.000 <T	BDL	
AUG	2.000 <T	BDL	1.000 <T	
SEP	1.000 <T	!LA	1.000 <T	
OCT	2.000 <T	3.000 <T	BDL	
NOV	BDL	BDL	BDL	
DEC	3.000 <T	3.000 <T	3.000 <T	
LINDANE (NG/L)				
		DET'N LIMIT = 1.000	GUIDELINE = 4000.0 (A1)	
FEB	.	.	2.000 <T	
MAR	.	.	1.000 <T	
APR	1.000 <T	1.000 <T	BDL	
MAY	1.000 <T	BDL	BDL	
JUN	1.000 <T	1.000 <T	BDL	
JUL	BDL	BDL	BDL	
AUG	BDL	BDL	BDL	
SEP	BDL	!LA	BDL	
OCT	BDL	1.000 <T	BDL	
NOV	BDL	BDL	BDL	
DEC	BDL	BDL	BDL	
THIODAN SULPHATE (NG/L)				
		DET'N LIMIT = 4.000	GUIDELINE =	N/A
FEB	.	.	BDL	
MAR	.	.	BDL	
APR	BDL	46.000	BDL	
MAY	BDL	BDL	BDL	
JUN	BDL	BDL	BDL	
JUL	BDL	BDL	BDL	
AUG	BDL	BDL	BDL	
SEP	BDL	!LA	BDL	
OCT	BDL	BDL	BDL	
NOV	BDL	BDL	BDL	
DEC	BDL	BDL	BDL	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
PHENOL (UG/L)	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW

PHENOLICS				
			DET'N LIMIT = 0.2	GUIDELINE = 2.00 (A3)
APR	BDL	BDL	.	.
MAY	1.200	.200 <T	.	.
JUN	.200 <T	.800 <T	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
RAW		TREATED	SITE 1	
			STANDING	FREE FLOW

SPECIFIC PESTICIDES				
ATRAZINE (NG/L)			DET'N LIMIT = 50.00	GUIDELINE = 60000. (B3)
FEB	.	.	.	BDL
MAR	.	.	.	70.000 <T
APR	BDL	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	!PE	!PE	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM	
RAW		TREATED	SITE 1		
			STANDING	FREE FLOW	

VOLATILES					
BENZENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 5.0	(D1)
FEB	.	.	.	BDL	
MAR	.	.	.	BDL	
APR	BDL	BDL	.	BDL	
MAY	BDL	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	
JUL	BDL	BDL	.	BDL	
AUG	BDL	BDL	.	BDL	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	
NOV	BDL	.100 <T	.	.100 <T	
DEC	BDL	.050 <T	.	BDL	

TOLUENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 100.0	(G)
FEB	.	.	.	BDL	
MAR	.	.	.	BDL	
APR	BDL	BDL	.	BDL	
MAY	BDL	BDL	.	BDL	
JUN	BDL	.100 <T	.	.100 <T	
JUL	BDL	BDL	.	BDL	
AUG	BDL	BDL	.	BDL	
SEP	BDL	BDL	.	BDL	
OCT	.100 UCS	.150 UCS	.	.100 UCS	
NOV	BDL	.150 <T	.	.150 <T	
DEC	BDL	BDL	.	BDL	

ETHYLBENZENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 3400.	(D3)
FEB	.	.	.	BDL	
MAR	.	.	.	BDL	
APR	BDL	BDL	.	BDL	
MAY	BDL	.500 <T	.	BDL	
JUN	BDL	.100 <T	.	.200 <T	
JUL	BDL	.450 <T	.	BDL	
AUG	BDL	.150 <T	.	.250 <T	
SEP	BDL	BDL	.	BDL	
OCT	.050 <T	.050 <T	.	BDL	
NOV	BDL	.100 <T	.	.150 <T	
DEC	BDL	.050 <T	.	BDL	

P-XYLENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 620.	(G)
FEB	.	.	.	BDL	
MAR	.	.	.	BDL	
APR	BDL	BDL	.	BDL	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MAY	BDL	BDL	.	BDL
JUN	BDL	.000 RMP	.	.000 RMP
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	.000 RMP	.	.000 RMP
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
<hr/>				
M-XYLENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 620. (G)
FEB	.	.	.	BDL
MAR	.	.	.	BDL
APR	BDL	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	.100 <T	.	.100 <T
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	.100 <T	.	.100 <T
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
<hr/>				
O-XYLENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 620. (G)
FEB	.	.	.	BDL
MAR	.	.	.	BDL
APR	BDL	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	.100 <T
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
<hr/>				
CHLOROFORM (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1+)
FEB	.	.	.	4.000
MAR	.	.	.	12.000
APR	BDL	14.000	.	14.000
MAY	BDL	12.000	.	10.000
JUN	BDL	17.100	.	10.100
JUL	BDL	18.000	.	17.000
AUG	BDL	19.300	.	18.200
SEP	.300 <T	13.100	.	19.300

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
OCT	BDL	9.700	.	10.100
NOV	BDL	9.300	.	8.900
DEC	BDL	18.000	.	9.700
<hr/>				
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)
FEB	.	.	.	7.000
MAR	.	.	.	9.000
APR	BDL	12.000	.	11.000
MAY	BDL	11.000	.	9.000
JUN	BDL	12.700	.	7.800
JUL	BDL	15.000	.	12.000
AUG	BDL	14.300	.	12.000
SEP	BDL	14.200	.	16.700
OCT	BDL	9.700	.	9.200
NOV	BDL	9.900	.	9.400
DEC	BDL	13.400	.	9.200
<hr/>				
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)
FEB	.	.	.	5.000
MAR	.	.	.	4.000
APR	BDL	8.000	.	6.000
MAY	BDL	11.000	.	7.000
JUN	BDL	9.600	.	5.800
JUL	BDL	11.000	.	7.000
AUG	BDL	8.200	.	6.500
SEP	BDL	9.400	.	8.600
OCT	BDL	6.400	.	5.300
NOV	BDL	6.200	.	5.400
DEC	BDL	7.800	.	5.500
<hr/>				
BROMOFORM (UG/L)		DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)
FEB	.	.	.	1.000
MAR	.	.	.	BDL
APR	BDL	BDL	.	BDL
MAY	BDL	.400 <T	.	.200 <T
JUN	BDL	.800 <T	.	1.200 <T
JUL	BDL	BDL	.	.200 <T
AUG	BDL	.200 <T	.	.400 <T
SEP	BDL	1.200 <T	.	1.000 <T
OCT	BDL	.400 <T	.	.400 <T
NOV	BDL	.800 <T	.	.600 <T
DEC	BDL	.400 <T	.	.400 <T
<hr/>				
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0		GUIDELINE = 350.0 (A1)

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
FEB	.	.	.	17.000
MAR	.	.	.	25.000
APR	BDL	34.000	.	31.000
MAY	BDL	34.400	.	26.200
JUN	BDL	40.200	.	24.900
JUL	BDL	44.000	.	36.200
AUG	BDL	42.000	.	37.100
SEP	.300	37.900	.	45.600
OCT	BDL	26.200	.	25.000
NOV	BDL	26.200	.	24.300
DEC	BDL	39.600	.	24.500

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE
----	-----	-----	-----	-----
CHEMISTRY (LAB)	CYANIDE	29	0.001	.200 (A1) MG/L
METALS	ARSENIC	40	0.001	.050 (A1) MG/L
	BERYLLIUM	40	0.001	.0002 (H) MG/L
	CYANIDE	29	0.001	.200 (A1) MG/L
	CADMIUM	40	0.300	5.000 (A1) UG/L
	SELENIUM	40	0.001	.010 (A1) MG/L
CHLOROAROMATICS	HEXACHLOROBUTADIENE	29	1.000	450. (D4) NG/L
	123 TRICHLOROBENZENE	29	5.000	10000. (I) NG/L
	1234 T-CHLOROBENZENE	29	1.000	10000. (I) NG/L
	1235 T-CHLOROBENZENE	29	1.000	10000. (I) NG/L
	124 TRICHLOROBENZENE	29	5.000	10000. (I) NG/L
	1245 T-CHLOROBENZENE	29	1.000	38000. (D4) NG/L
	135 TRICHLOROBENZENE	29	5.000	10000. (D4) NG/L
	OCTACHLOROSTYRENE	29	1.000	N/A NG/L
	PENTACHLOROBENZENE	29	1.000	74000. (D4) NG/L
	236 TRICHLOROTOLUENE	29	5.000	N/A NG/L
	26A TRICHLOROTOLUENE	29	5.000	N/A NG/L
CHLOROPHENOLS	234 TRICHLOROPHENOL	4	50.	N/A NG/L
	2345 T-CHLOROPHENOL	4	50.	N/A NG/L
	2356 T-CHLOROPHENOL	4	50.	N/A NG/L
	245-TRICHLOROPHENOL	4	50.	2600000(D4) NG/L
	246-TRICHLOROPHENOL	4	50.	10000. (C1) NG/L
	PENTACHLOROPHENOL	4	50.	10000. (C1) NG/L
PAH	PHENANTHRENE	8	0	N/A NG/L
	ANTHRACENE	8	0	N/A NG/L
	FLUORANTHENE	8	0	42000 (D4) NG/L
	PYRENE	8	0	N/A NG/L
	BENZO(A)ANTHRACENE	8	0	N/A NG/L
	CHRYSENE	8	0	N/A NG/L
	DIMETH. BENZ(A)ANTHR	8	0	N/A NG/L
	BENZO(E)PYRENE	8	0	N/A NG/L
	BENZO(J) FLUORANTHEN	8	N/A	N/A NG/L
	BENZO(B) FLUORANTHEN	8	0	N/A NG/L
	PERYLENE	8	0	N/A NG/L
	BENZO(K) FLUORANTHEN	8	N/A	N/A NG/L
	BENZO (A) PYRENE	8	0	10 (B1) NG/L
	BENZO(G,H,I) PERYLEN	8	0	N/A NG/L
	DIBENZO(A,H) ANTHRAC	8	0	N/A NG/L
	INDENO(1,2,3-C,D) PY	8	0	N/A NG/L
	BENZO(B) CHRYSENE	8	0	N/A NG/L
	ANTHANTHRENE	8	N/A	N/A NG/L
	CORONENE	8	0	N/A NG/L
PESTICIDES & PCB	ALDRIN	29	1.000	700.0 (A1) NG/L
	BETA BHC	29	1.000	300. (G) NG/L
	ALPHA CHLORDANE	29	2.000	7000.0 (A1) NG/L
	GAMMA CHLORDANE	29	2.000	7000.0 (A1) NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE
-----	-----	-----	-----	-----
PESTICIDES & PCB	DIELDRIN	29	2.000	700.0 (A1) NG/L
	METHOXYCHLOR	29	5.000	100000. (A1) NG/L
	THIODAN I	29	2.000	74000. (D4) NG/L
	THIODAN II	29	4.000	74000. (D4) NG/L
	ENDRIN	29	4.000	200.0 (A1) NG/L
	HEPTACHLOR EPOXIDE	29	1.000	3000.0 (A1) NG/L
	HEPTACHLOR	29	1.000	3000.0 (A1) NG/L
	MIREX	29	5.000	N/A NG/L
	OXYCHLORDANE	29	2.000	N/A NG/L
	OPDDT	29	5.000	30000. (A1) NG/L
	PCB	29	20.000	3000. (A2) NG/L
	PP-DDD	29	5.000	N/A NG/L
	PPDDE	29	1.000	30000. (A1) NG/L
	PPDDT	29	5.000	30000. (A1) NG/L
	ATRATONE	29	50.	N/A NG/L
	ALACHLOR	29	500.	35000. (D2) NG/L
	ETHYLENE DIBROMIDE	29	0	50.0 (G) UG/L
	HCB	29	1.000	10.0 (C1) NG/L
SPECIFIC PESTICIDES	TOXAPHENE	29	N/A	5000. (A1) NG/L
	AMETRYNE	29	50.00	300000. (D3) NG/L
	BLADEX	29	100.00	10000. (B3) NG/L
	PROMETONE	29	50.00	52500. (D3) NG/L
	PROPAZINE	29	50.00	16000. (D2) NG/L
	PROMETRYNE	29	50.00	1000. (B3) NG/L
	SENCOR	29	100.00	80000. (B2) NG/L
	SIMAZINE	29	50.00	10000. (B3) NG/L
	2,4,5-T	4	50.00	35000. (D2) NG/L
	2,4-D	4	100.00	100000. (A1) NG/L
	24DCHLRPHENOXYBUTYRC	4	200.00	18000. (B3) NG/L
	2,4-DP	4	100.00	N/A NG/L
	DICAMBA	4	100.00	87000. (B3) NG/L
	PICHLORAM	4	100.00	2450000 (D3) NG/L
	SILVEX	4	50.00	10000. (A1) NG/L
	DIAZINON	4	20.	14000. (A1) NG/L
	DICHLOROVOS	4	20.	N/A NG/L
	DURSBAN	4	20.	N/A NG/L
	ETHION	4	20.	35000. (G) NG/L
	GUTHION	4	N/A	N/A NG/L
	MALATHION	4	20.	160000. (G) NG/L
	MEVINPHOS	4	20.	N/A NG/L
	METHYL PARATHION	4	50.	7000. (B3) NG/L
	METHYLTRITHION	4	20.	N/A NG/L
	PARATHION	4	20.	35000. (B1) NG/L
	PHORATE	4	20.	35.0 (D2) NG/L
	RELDAN	4	20.	N/A NG/L
	RONNEL	4	20.	N/A NG/L
	AMINOCARB	4	N/A	N/A NG/L
	BENOMYL	4	N/A	N/A NG/L
	BUX	4	2000.	N/A NG/L
	CARBOFURAN	4	2000.	18000. (D3) NG/L
	CIPC	4	2000.	350000. (G) NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM GRIMSBY W.T.P. 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE
-----	-----	-----	-----	-----
SPECIFIC PESTICIDES	DIALATE	4	2000.	30000. (H) NG/L
	EPTAM	4	2000.	N/A NG/L
	IPC	4	2000.	N/A NG/L
	PROPOXUR	4	2000.	90000. (G) NG/L
	SEVIN	4	200.	70000. (A1) NG/L
	SUTAN	4	2000.	245000. (D3) NG/L
	METOLACHLOR	29	500.	50000. (B3) NG/L
VOLATILES	1,1 DICHLOROETHYLENE	29	0	7.0 (D1) UG/L
	DICHLOROMETHANE	29	0	1750. (D3) UG/L
	T1,2DICHLOROETHYLENE	29	0	350. (D3) UG/L
	1,1 DICHLOROETHANE	29	0	N/A UG/L
	111, TRICHLOROETHANE	29	0	200. (D1) UG/L
	1,2 DICHLOROETHANE	29	0	5.0 (D1) UG/L
	CARBON TETRACHLORIDE	29	0	5.0 (D1) UG/L
	1,2 DICHLOROPROPANE	29	0	10.0 (G) UG/L
	TRICHLOROETHYLENE	29	0	5.0 (D1) UG/L
	112 TRICHLOROETHANE	29	0	.60 (D4) UG/L
	T-CHLOROETHYLENE	29	0	10.0 (C2) UG/L
	1122 T-CHLOROETHANE	29	0	0.17 (D4) UG/L
	CHLOROBENZENE	29	0	1510. (D3) UG/L
	1,4 DICHLOROBENZENE	29	0	75.0 (D1) UG/L
	1,3 DICHLOROBENZENE	29	0	130. (G) UG/L
	1,2 DICHLOROBENZENE	29	0	130. (G) UG/L
	TRIFLUOROCHLOROTOLUE	29	0	N/A UG/L
	ETHYLENE DIBROMIDE	29	0	50.0 (G) UG/L

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and

missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area;
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 160 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information

This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

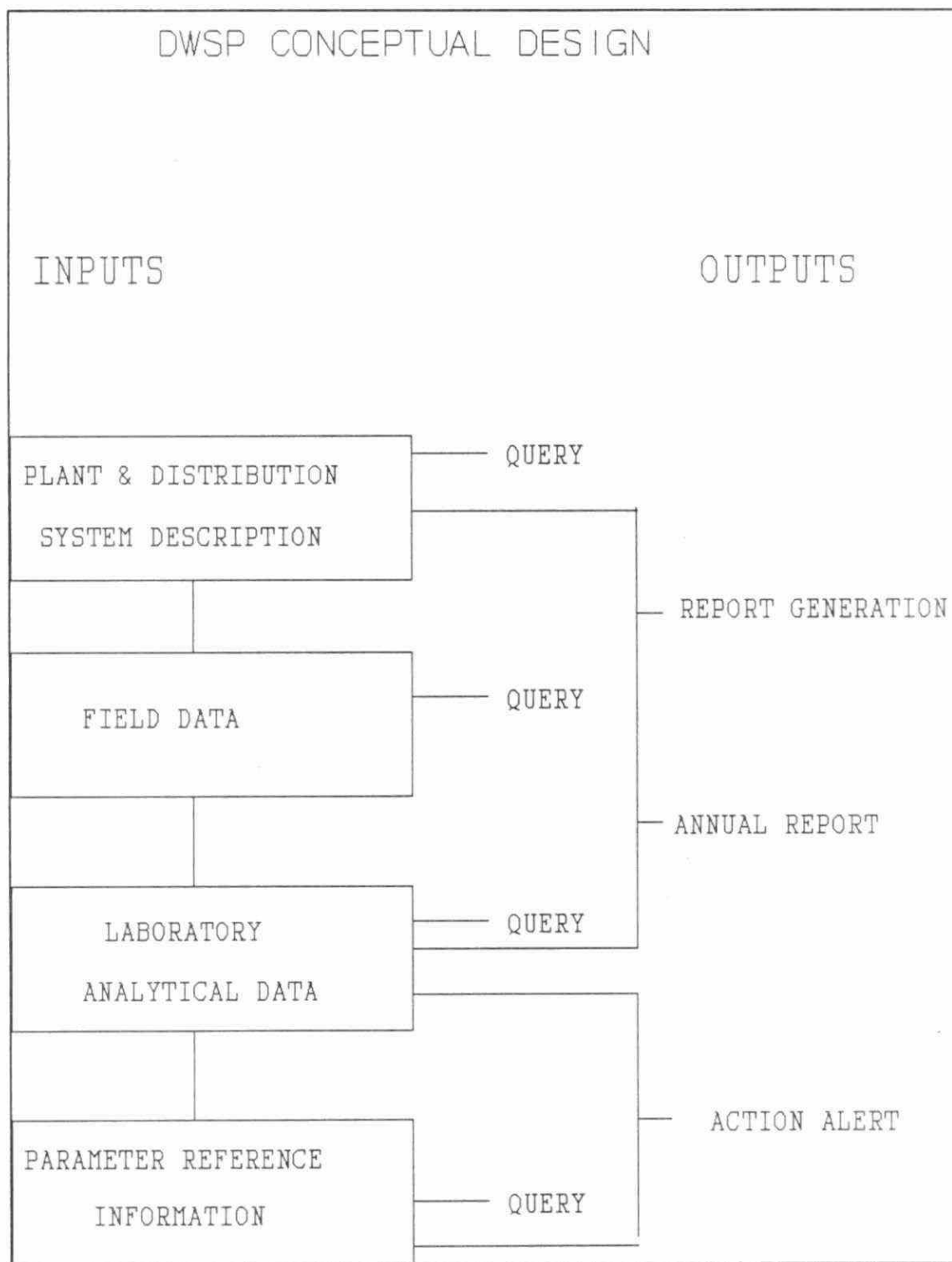


FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P)
REFERENCE
BENZENE

PARAMETER

SOURCE FROM	TO	METHOD	TARG	UNIT	NOTE
EPA C 86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA C 80/11		NOMETH	6.60	063000 UG/L	
FERC C 84/05		NOMETH	1.00	063000 UG/L	
WHO C 84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE

CAS#: 71432

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L

SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27),
CYCLOHEXATRIENE (41)CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE,
NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE,
AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES:

SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)

THRESHOLD ODOUR: NO DATA

THRESHOLD TASTE: 0.5 MG/L IN WATER (39)

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING
ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL
TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE
MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL
QUANTITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY
SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL
TAR DISTILLATION, FOOD PROCESSING, TANNING.USES: PREPARATION OF ETHYL BENZENE USED AS A STYRENE
MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN
PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY,
DEGREASING AND CLEANSING AGENT, GASOLINE.TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES
MUCOUS MEMBRANES, SYMPTOMS INCLUDE RESTLESSNESS,
CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE;
CHRONIC - ANEMIA AND LEUKEMIA (45).

CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN

REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM
FOLLOWED BY SEDIMENTATION, COAGULATION AND
FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).

MOLECULAR WEIGHT: 78.12 GRAMS

MELTING POINT: 5.5 DEGREES C (27)

BOILING POINT: 80.1 DEGREES C (27)

SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)

VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C

HENRY'S LAW CONSTANT: 0.00555 ATM M_2 /MOLELOG OCT./WATER PAR.COEFF: $K=1.0$ $1/N=1.6$ $R=.97$ $PH=5.3$

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	<ul style="list-style-type: none">-500 mL clear plastic bottle-rinse bottle with sample three times and discard water-fill to line
Bacti	<ul style="list-style-type: none">-250 mL clear glass bottle with white seal on cap-do <u>not</u> rinse bottle; preservative has been added-avoid touching bottle neck or inside of cap-fill to top of red label as marked
Metals	<ul style="list-style-type: none">-500 mL clear plastic bottle with white lid-rinse bottle and cap three times, discard-fill to line-add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	<ul style="list-style-type: none">-250 mL clear glass bottle-do <u>not</u> rinse bottle-tilt bottle when filling-fill bottle completely; there should be no air bubbles.
Organic (OWOC), (OWTRI), (OAPAHX)	<ul style="list-style-type: none">-1 liter brown glass bottle per scan-do <u>not</u> rinse bottle-fill to approx. 1" from top-when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	<ul style="list-style-type: none">-500 mL clear plastic bottle-do <u>not</u> rinse bottle-fill to approx. 1" from top-add 10 drops sodium hydroxide (Caution: NaOH is corrosive)

Mercury

- 250 mL clear glass bottle
- rinse bottle and cap three times, discard then fill to top of label
- add 20 drops each nitric acid and potassium dichromate
(**Caution:** HNO_3 and KCrO_7 corrosive)

Phenols

- 250 mL clear glass bottle
- do not rinse bottle
- fill to top of label as marked

Steps

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry

- 500 mL clear plastic bottle
- rinse bottle with sample three times and discard
- fill to line

Metals

- 500 mL clear plastic bottle with white lid
- rinse bottle and cap three times, discard
- fill to line
- add 10 drops nitric acid
(**Caution:** HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	<ul style="list-style-type: none">-500 mL clear plastic bottle-rinse bottle with sample three times and discard water-fill to line
Bacti	<ul style="list-style-type: none">-250 mL clear glass bottle with white seal on cap-do <u>not</u> rinse bottle; preservative has been added-avoid touching bottle neck or inside of cap-fill to top of red label as marked
Metals	<ul style="list-style-type: none">-500 mL clear plastic bottle with white lid-rinse bottle and cap three times, discard-fill to line-add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	<ul style="list-style-type: none">-250 mL clear glass bottle-do <u>not</u> rinse bottle; preservative has been added-tilt bottle when filling-fill bottle completely; there should be no air bubbles
Organic (OWOC), (OWTRI)	<ul style="list-style-type: none">-1 liter brown glass bottle per scan-do <u>not</u> rinse bottle: preservative has been added-fill to approx. 1" from top
Cyanide	<ul style="list-style-type: none">-500 mL clear plastic bottle-do <u>not</u> rinse bottle: preservative has been added-fill to approx. 1" from top-add 10 drops sodium hydroxide (Caution: NaOH is corrosive)
Mercury	<ul style="list-style-type: none">-250 mL clear glass bottle-rinse bottle and cap three times, discard then fill to top of label-add 20 drops each nitric acid and potassium dichromate (Caution: HNO_3 and KCrO_7 corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for ten minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

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1988

Grimsby water treatment plant :
annual report 1987.

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